WHAT IS CLAIMED IS:

1. An audio loudness compensation system, comprising:

a level sensor receiving an audio input signal and operable to estimate a level of the audio input signal over a first predetermined time period;

a level mapper receiving the estimated level and operable to map the estimated level to a raw audio gain in response to a slope setting and an offset setting; and

a compensation filter receiving the raw audio gain and operable to modify the audio input signal in response to the raw audio gain, a center frequency setting and a bandwidth setting, and generate a loudness compensated audio output signal.

2. The system, as set forth in claim 1, further comprising:

an attack and decay filter receiving the raw audio gain and operable to smooth out increasing and decreasing changes in the raw audio gain in response to a second predetermined time period, and the compensation filter receiving and operating in response to the smoothed raw audio gain.

3. The system, as set forth in claim 1, wherein the compensation filter comprises a bandpass filter.

4. The system, as set forth in claim 2, wherein the compensation filter comprises:

an allpass filter receiving the audio input signal and operable to filter the audio input signal in response to the center frequency setting and the bandwidth setting, and generate a filtered audio input signal;

a gain circuit operable to generate a compensation gain value in response to the smoothed raw audio gain; and

an output circuit operable to generate an audio output signal in response to the compensation gain value and the filtered audio input signal.

5. The system, as set forth in claim 2, wherein the compensation filter comprises:

an allpass filter receiving the audio input signal and operable to filter the audio input signal in response to the center frequency setting and the bandwidth setting, and generate a filtered audio input signal;

a first summer operable to determine a difference between the audio input signal and the filtered audio input signal and generate a difference audio input signal;

a gain circuit operable to generate a compensation gain value in response to the smoothed raw audio gain;

a multiplier operable to multiply the difference audio input signal with the compensation gain value and generate a compensated audio input signal; and

a second summer operable to sum the compensated audio input signal and the audio input signal and generate the audio output signal.

6. The system, as set forth in claim 5, wherein the gain circuit comprises a selector operable to select between a first gain multiplier value and a second gain multiplier value in response to a user-input, and the gain circuit generating the compensation gain value in response to the selected gain multiplier.

7. The system, as set forth in claim 6, wherein the first gain multiplier is zero.

8. The system, as set forth in claim 6, wherein the second gain multiplier is 0.5.

9. The system, as set forth in claim 1, wherein the level sensor comprises:

an absolute value circuit operable to determine the absolute value of the audio input signal; and

a filter operable to filter the absolute value of the audio input signal in response to a time constant.

10. The system, as set forth in claim 9, wherein the filter is an alpha filter.

11. The system, as set forth in claim 1, wherein the level mapper comprises:

a logarithm block operable to determine the logarithm of the estimated level;

a mapping block operable to map the estimated level to the filter gain in the logarithm domain; and

an antilogarithm block operable to determine the antilogarithm of the filter gain.

12. The system, as set forth in claim 1, wherein the level mapper comprises:

a logarithm block operable to determine the logarithm of the estimated level;

a multiplier operable to multiply the logarithm of the estimated level with the gain setting and generate a level;

a summer operable to add the offset setting to the level and generate the filter gain in the logarithm domain; and

an antilogarithm block operable to determine the antilogarithm of the filter gain.

13. The system, as set forth in claim 10, wherein the logarithm block is operable to estimate the base 2 logarithm of the estimated level, and the antilogarithm block is operable to estimate the base 2 antilogarithm of the filter gain.

14. An audio loudness compensation system, comprising:

a level mapper receiving a volume control user input and operable to map the volume control user input to a raw audio gain in response to a slope user input and an offset user input, the slope and offset user inputs describing a linear function to be applied to the input level; and

a compensation filter receiving the raw audio gain and operable to modify the audio input signal in response to the raw audio gain, a center frequency user input and a bandwidth user input, and generating a loudness compensated audio output signal.

15. The system, as set forth in claim 14, wherein the compensation filter comprises a bandpass filter.

16. The system, as set forth in claim 14, wherein the compensation filter comprises:

an allpass filter receiving the audio input signal and operable to filter the audio input signal in response to the center frequency user input and the bandwidth user input, and generate a filtered audio input signal;

a gain circuit operable to generate a compensation gain value in response to the smoothed raw audio gain; and

an output circuit operable to generate an audio output signal in response to the compensation gain value and the filtered audio input signal.

17. The system, as set forth in claim 14, wherein the compensation filter comprises:

an allpass filter receiving the audio input signal and operable to filter the audio input signal in response to the center frequency user input and the bandwidth user input, and generate a filtered audio input signal;

a first summer operable to determine a difference between the audio input signal and the filtered audio input signal and generate a difference audio input signal;

a gain circuit operable to generate a compensation gain value in response to the smoothed raw audio gain;

a multiplier operable to multiply the difference audio input signal with the compensation gain value and generate a compensated audio input signal; and

a second summer operable to sum the compensated audio input signal and the audio input signal and generate the audio output signal.

18. The system, as set forth in claim 17, wherein the gain circuit comprises a selector operable to select between a first gain multiplier value and a second gain multiplier value in response to a user-input, and the gain circuit generating the compensation gain value in response to the selected gain multiplier.

19. The system, as set forth in claim 18, wherein the first gain multiplier is zero.

20. The system, as set forth in claim 18, wherein the second gain multiplier is 0.5.

21. The system, as set forth in claim 14, wherein the level mapper comprises:

a logarithm block operable to determine the logarithm of the estimated level;

a mapping block operable to map the estimated level to the filter gain in the logarithm domain; and

an antilogarithm block operable to determine the antilogarithm of the filter gain.

22. The system, as set forth in claim 14, wherein the level mapper comprises:

a logarithm block operable to determine the logarithm of the estimated level;

a multiplier operable to multiply the logarithm of the estimated level with the slope setting and generate a gain;

a summer operable to add the offset setting to the gain and generate the filter gain in the logarithm domain; and

an antilogarithm block operable to determine the antilogarithm of the filter gain.

23. The system, as set forth in claim 22, wherein the logarithm block is operable to estimate the base 2 logarithm of the estimated level, and the antilogarithm block is operable to estimate the base 2 antilogarithm of the filter gain.

24. The system, as set forth in claim 14, further comprising an attack and decay filter receiving the raw audio gain and operable to smooth out increasing and decreasing changes in the raw audio gain in response to predetermined time constants.

25. A loudness compensation method, comprising:

receiving an input;

mapping the input to a filter level using a slope input and an offset input, the slope and offset inputs defining a linear function converting the filter level to a raw audio gain;

smoothing the raw audio gain;

allpass filtering the input and generating a filtered input; and

generating an audio output in response to the filtered input and the smoothed raw audio gain.

26. The method, as set forth in claim 25, further comprising:

subtracting a first predetermined constant from the smoothed raw audio gain and multiplying the result with a second predetermined constant, and generating a gain value; and

multiplying the gain value with a difference between the filtered input and the input.

27. The method, as set forth in claim 26, wherein subtracting the first predetermined constant comprises subtracting one from the smoothed raw audio gain, and wherein multiplying the result comprises multiplying the result with one of 0.5 and 0, in response to a defeat input.

28. The method, as set forth in claim 25, wherein the input is a volume control user input.

29. The method, as set forth in claim 25, wherein the input is a sensed level of the audio signal.

30. The method, as set forth in claim 25, further comprising receiving an audio input and estimating a level of the audio input over a predetermined time period, and generating the output.

31. The method, as set forth in claim 30, wherein estimating the level comprises taking the absolute value of the audio input and low pass filtering the absolute value of the audio input to generate the input.

32. The method, as set forth in claim 30, wherein mapping the level comprises:

estimating a base 2 logarithm of the input;

multiplying the base 2 logarithm of the input with the slope input and generating a product;

summing the product with the offset input and generating a sum; and

estimating a base 2 antilogarithm of the sum.